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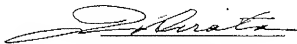
1. That I am well acquainted with both the English and Japanese languages, and
2. That the attached document is a true and correct translation made by me to the best of my knowledge and belief of:-

The specification accompanying the Application No. 2000-145407

for a Patent made in Japan

filed on May 17, 2000

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Tadao HIRATA

(No witness required)

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[ITEM] DRAWINGS 1

[ITEM] ABSTRACT 1

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[Document] Specification

[Title of the Invention] PORTABLE FOLDING COMMUNICATION UNIT

[Claims]

[Claim 1] A folding portable communication unit which is composed of first
5 and second cabinets and a hinge for so supporting said first and second cabinets that
they are rotational around said hinge, comprising:

a display operation part which is situated on a rear cover of said first or
second cabinet,

wherein display contents and operation can be watched and performed said
10 information can be watched and performed in case that said first and second
cabinets are folded.

[Claim 2] A folding portable communication unit which is composed of first
and second cabinets and a hinge for so supporting said first and second cabinets that
they are rotational around said hinge, comprising:

15 first display operation part which is situated on an obverse surface of said
first and second cabinets, and

second display operation part which is situated on a rear cover of said first or
second cabinet,

[Claim 3] A folding portable communication unit as defined in claim 2,
20 wherein:

said first and second cabinets include controlling means for controlling
whether input information is to be displayed on said first or second display operation
part depending on a kind of said input information.

[Claim 4] A folding portable communication unit as defined in claim 3 or 4,
25 wherein:

a detecting means for detecting whether said first and second cabinets are
folded or not is provided, and

said controlling means for further controlling whether said input information is

to be displayed on said first or second display operation part depending on a result of detection performed by said detecting means is provided.

[Claim 5] A folding portable communication unit as defined in claim 3 or 4, wherein:

5 said control means displays the image on said first display operation part, when the information is displayed.

[Claim 6] A folding portable communication unit as defined in claim 2, wherein:

 a detecting means for detecting whether said first and second cabinets are
10 folded or not is provided, and

 a controlling means for controlling whether said input information is to be displayed on said first or second display operation part depending on a result of detection performed by said detecting means is provided.

[Claim 7] A folding portable communication unit as defined in claim 6,
15 wherein:

 said control means displays the information on said second display operation part when said detecting means detects that the cabinets are folded.

[Claim 8] A folding portable communication unit as defined in claim 2, wherein:

20 said control means for controlling whether said input information is displayed on said first or second display operation part in accordance with of instruction of said user is provided.

[Industrial Field of the Invention]

 The invention related to a folding portable communication unit which can be
25 folded if a user needs, and handy to carry.

[Prior Arts]

 Recently, a portable communication unit, such as a mobile telephone, has function of a data terminal for furnishing various information as well as that of a

telephonic communication through a voice, and is spread throughout the world during the past few years. The portable communication unit has full facilities for users because of its excellent portability, which is an extremely important factor of this instrument. In the portable communication unit, since it is indispensable to have
5 function of communication through the voice, a sound-sensing device, such as a microphone, should be situated close by the mouth of the user, and a sound-generating device, such as a speaker, should be situated close by the ear. Accordingly, the length of an external shape of the portable communication unit must be nearly the same as an interval between the mouth and the ear, so that it becomes
10 considerably large.

From this point of view, a folding portable communication unit shown in Figs. 7 has been devised heretofore. Figs. 7 are perspective views for showing an external shape of a conventional folding portable communication unit, and (a) shows a state that cabinets of the folding portable communication unit are opened,
15 and (b) shows a state that the cabinets thereof are closed. As shown in Figs. 7(a), (b), the conventional folding portable communication unit is composed of an upper cabinet 100, a lower cabinet 102, and a hinge 104 for so supporting the upper and lower cabinets 100, 102 that they are freely open and closed in broad outline.

The upper cabinet 100 is provided with an antenna 106 for transmitting and
20 receiving electric waves, a speaker 108 for informing aural information received by the antenna 106 to a user as a voice, and a LCD (liquid crystal display, hereinafter) 110 for displaying various information. The lower cabinet 102 is provided with a key operation unit 112 for inputting a data to be transmitted from the user in accordance with his operation, and a microphone 114 for converting a voice of the
25 user into an audio information. In case that the user uses the folding portable communication unit, he operates the key or speaks it is opened as shown in Fig.7(a). When he does not use the folding portable communication unit and brings it with him, it is in the state of closed as shown in Fig.17(b).

[Problems to be solved by the Invention]

However, in the conventional folding portable communication unit, the LCD 110 for displaying various information for user and the key operation unit 112 for inputting the data by the user's operation are respectively provided only one, and they are exposed only when it is opened. Accordingly, when it is closed, the user can neither watch the contents of the LCD 100 nor operate the key.

In recent years, the portable communication unit has come to be used not only as means for transmitting and receiving voice information but also as a data terminal for furnishing the various data, and function as the data terminal is given much weight. Accordingly, it is expected in general that the portable communication unit in future will be required to be compact, light weight, easy to see the LCD and highly operable. However, if the portable communication unit becomes too small by regarding compactness and lightness as important excessively, the surface area of the whole portable communication unit is reduced, and the MMI (man machine interface), such as the LCD or the key operation unit, becomes too small, so that the portable communication unit becomes hard to operate. The aforementioned arguments hold in the case of the folding portable communication unit also.

Accordingly, it is an object of the invention to provide a folding portable communication unit which secures compactness, lightness, visibility of a LCD, and improved operability.

[Means for solving the Problems]

According to the first feature of the invention, a folding portable communication unit which is composed of first and second cabinets and a hinge for so supporting said first and second cabinets that they are rotational around said hinge, comprises:

a display operation part which is situated on a rear cover of the first or second cabinet,

wherein display contents and operation can be watched and performed the

information can be watched and performed in case that the first and second cabinets are folded.

According to the second feature of the invention, a folding portable communication unit which is composed of first and second cabinets and a hinge for
5 so supporting the first and second cabinets that they are rotational around the hinge, comprises:

first display operation part which is situated on an obverse surface of the first and second cabinets, and

10 second display operation part which is situated on a rear cover of the first or second cabinet,

In a folding portable communication unit according to the second feature of the invention, wherein:

a controlling means for controlling whether input information is to be displayed on the first or second display operation part depending on a kind of the
15 input information is provided.

In a folding portable communication unit according to the invention, wherein:

a detecting means for detecting whether the first and second cabinets are folded or not is provided, and

the controlling means for further controlling whether the input information is to
20 be displayed on the first or second display operation part depending on a result of detection performed by the detecting means is provided.

According to further feature of the invention, a folding portable communication unit, wherein:

the control means displays the image on the first display operation part, when
25 the information is displayed.

A folding portable communication unit according to second feature of the invention, wherein:

a detecting means for detecting whether the first and second cabinets are

folded or not is provided, and

a controlling means for controlling whether the input information is to be displayed on the first or second display operation part depending on a result of detection performed by the detecting means is provided.

5 In a folding portable communication unit according to the invention, wherein:

the control means displays the information on the second display operation part when the detecting means detects that the cabinets are folded.

In a folding portable communication unit according to the second feature of the invention, wherein:

10 the control means for controlling whether the input information is displayed on the first or second display operation part in accordance with of instruction of the user is provided.

[Preferred Embodiments of the Invention]

15 Hereafter, a folding portable communication unit according to a preferred embodiment of the invention will be explained in detail referring to the appended drawings. Figs.1 show perspective views for external shapes of a folding portable communication unit according to a preferred embodiment of the invention, and (a) is a perspective view for showing a state that the cabinets are opened, and (b) is a perspective view for showing a state that the cabinets are closed. The folding
20 portable communication unit shown in Figs. 1(a), (b), is composed of an upper cabinet 10 and a lower cabinet 12, and a hinge 14 for so supporting the upper and lower cabinets 10, 12, that they are rotational around the hinge 14 in broad outline.

The upper cabinet 10 is provided with an antenna 16 for transmitting and receiving electric waves, a speaker 18 for informing aural information received by the
25 antenna 16 to a user as voice, and a LCD (Liquid Crystal Display) 20 for displaying various information. Moreover, the lower cabinet 12 is provided with a key operation unit 22 for inputting data to be transmitted from the user in accordance with his operation, and a microphone 24 for converting a voice of the user into an audio

signal. The aforementioned structure is similar to that of the conventional folding portable communication unit shown in Figs.7.

In addition to the structure as aforementioned, the folding portable communication unit according to the preferred embodiment of the invention is that it is provided with a simplified LCD 26 and a simplified key operation unit 28, each being situated on a rear cover 10a of the upper cabinet 10. That is to say, according to the conventional folding portable communication unit shown in Figs.7, although the user can confirm characters etc. displayed on the LCD 110 in case that the upper and lower cabinets 100, 102 are opened, he can neither confirm information displayed on the LCD 110 nor operate the key in case that the upper and lower cabinets 100, 102 are closed.

Since the folding portable communication unit according to the preferred embodiment of the invention is provided with the simplified LCD 26 and the simplified key operation unit 28 situated on the rear cover 10a of the upper cabinet 10 in addition to the LCD 20 and the key operation unit 22, the user can select either of the two LCDs and either of the two key operation units depending on the state that the folding portable communication unit is open or closed. Accordingly, operability of the folding portable communication unit can be improved, and electric power consumed therein can be saved. That is to say, when the folding portable communication unit is opened, various information are displayed on the LCD 20, and the contents of the user's operation can be input through the key operation unit 22. On the other hand, when the folding portable communication unit is closed, various information are displayed on the simplified LCD 26, and the contents of the user's operation can be input through the simplified key operation unit 28. Electric power consumed in the LCDs 20, 26 or LEDs (light-emitting diodes, hereinafter) serving as illuminating functions, such as back lights, can be saved by selectively using the LCD 20 together with the key operation unit 22 and the simplified LCD 26 together with the simplified key operation unit 28 depending on the existing conditions. Since the

simplified LCD 26 is situated on the rear cover 10a of the upper cabinet 10, the displaying area is smaller than that of the LCD 20.

Fig.2 shows an example of a structure of the simplified key operation unit 28 used in the folding portable communication unit according to the preferred embodiment of the invention. As shown in Fig.2, the simplified key operation unit 28 is provided with arrayed buttons 30 which are composed of the buttons printed with numerals, symbols, etc. and a four direction-selecting key 32 which is pressed by the user in directions denoted by d1, d2, d3, d4 to instruct the respective selections in upward, downward, rightward and leftward directions. Accordingly, the user operates the arrayed buttons 30 and the four direction-selecting key 32, and thereby inputs various operating information.

Next, an electrical configuration of the folding portable communication unit according to the preferred embodiment of the invention will be explained. Fig.3 is a block diagram for showing the electrical configuration of the folding portable communication unit according to the preferred embodiment of the invention. In FIG.3, the same reference numerals are denoted the respective elements corresponding to the elements as used in FIG.1. As shown in Fig.3, the electrical configuration of the folding portable communication unit is composed of an antenna 16, a radio unit 40, a control unit 42, a microphone 24, a speaker 18, a key operation unit 22, a simplified key operation unit 28, a memory 44, an open / closed-detecting switch 46, a LCD-driver 48, a LCD 20, and a simplified LCD 26

The antenna 16 transmits and receives the electric waves, and a radio signal received by the antenna 16 is supplied to the radio unit 40. When the radio signal received by the antenna 16 is aural information, the radio unit 40 converts the radio signal into the audio signal (in low frequency), and supplies it to the control unit 42. The control unit 42 outputs the supplied audio signal to the speaker 18, and the speaker 18 converts the audio signal into a voice. Moreover, if an audio signal is inputted from the microphone 24, the audio signal is supplied to the radio unit 40 via

the control unit 42, converted into aural information therein, and transmitted from the antenna 16 as the radio signal.

Moreover, the control unit 22 conducts various controls in accordance with operational information inputted from the key operation unit 22 or the simplified key operation unit 28. The memory 44 is composed of a RAM (Random Access Memory) and a ROM (Read Only Memory), and stores a program for controlling operation of the folding portable communication unit or character information received by the antenna 16 temporarily. The open / close-detecting switch 46 detects whether the upper and lower cabinets 10, 12 shown in Fig.1 are opened or closed. The LCD-driver 48 controls displays of the LCD 20 and the simplified LCD. The control unit 42 makes the LCD-driver 48 decide which display is to be used the LCD 20 or the simplified LCD 26 depending on the output signal of the open / close-detecting switch 46 and on the kind of information to be displayed.

Herein, control for selecting the display in accordance with the kind of information to be displayed will be explained referring to Fig.4. Fig.4 is a block diagram for explaining control for selecting the display in accordance with the kind of information to be displayed. As mentioned in the above, since the area of the simplified LCD 26 is smaller than that of the LCD 20, the LCD-driver 48 makes the simplified LCD 20 display simple information, such as a telephone number or a short message (SMS) . On the other hand, WEB information or pictorial information is displayed on the LCD 20 having a wide area. However, the aforementioned control for selecting the display is only an exemplification, and the display may be selected in accordance with the output signal of the open / close-detecting switch 46. For example, when the portable communication unit is closed, the data inputted through the simplified key operation unit 28 is displayed on the simplified LCD 26 ; and when the unit is opened, the data inputted through the key operation unit 22 is displayed on the LCD 20. The method mentioned in the above is desirable because facility for usage increases.

Next, explanations will be given to the LCD 20 and the simplified LCD 26. Figs.5 are drawings to explain the structure of the LCD 20 and the simplified LCD 26, and FIG.5(a) shows a structure of the simplified LCD 26 and FIG.5(b) shows a structure of the LCD 20. As shown in Fig.5(a) the simplified LCD 26 is provided with a LCD panel 50 having a small surface area, and the LCD panel 50 is provided with two LEDs 52a, 52b serving as back lights thereof. On the other hand, the LCD 20 shown in Fig.5(b) is provided with a LCD panel 54 having a large surface area, and the LCD panel 54 is provided with eight LEDs 56a to 56h serving as back lights thereof. For example, when the portable communication unit is closed, the desired data can be obtained without opening the portable communication unit by displaying information on the simplified LCD 26. Accordingly, operation of the folding portable communication unit can be simplified, facility for usage increases, and consumed electric power can be saved.

Next, the states of the LCD 20 and the simplified LCD 26 mounted on the folding portable communication unit will be explained. Fig.6 is a cross-sectional view of both the LCD 20 and the simplified LCD 26 shown in a plane which cuts the upper cabinet 10 vertically to the axis of the hinge 14. In Fig.6, the structural elements which are not related to the explanations are omitted. As shown in Fig.6, the LCD 20, the simplified LCD 26 and the LCD-driver 48 are respectively mounted on a substrate 60 (PCB), where the LCD 20 is mounted on the obverse surface of the substrate 60, and the simplified LCD 26 and the LCD-driver 48 are mounted on the reverse surface of the substrate 60. Since the simplified LCD 26 and the LCD-driver 48, each having a small surface area, are mounted on the reverse surface of the substrate 60, and the LCD 20 having the large surface area is mounted on the obverse surface of the substrate 60, therefore, they are uniformly mounted on the both surfaces and the mounted area is reduced.

As mentioned in the above, when the upper and lower cabinets 10, 12 are opened in the folding portable communication unit, the open / close-detecting switch

46 detects that both the cabinets 10, 12 are opened, and the control unit 42 controls the LCD-driver 48 so that information is displayed on the LCD 10. When the upper and lower cabinets 10, 12 are closed, the open / close-detecting switch 46 detects that both the cabinets are closed, and the control unit 42 controls the LCD-driver 48 so that information is displayed on the simplified LCD 26.

Further, when the cabinets are opened, the operational information can be input through the key operation unit 22 in accordance with the user's operation. Furthermore, the operational information can be input through the simplified key operation unit 28 in accordance with the user's operation even though the cabinets are closed. Accordingly, if the user expects to input the short message, for example, he can input the message while confirming the information input by operating the simplified key operation unit 28 through the simplified LCD 26, and it is highly convenient.

Although explanations are given to the folding portable communication unit according to the preferred embodiment of the invention in the above descriptions, the applications of the invention are never restricted to the aforementioned embodiment, and several modifications and improvements of the embodiment can be devised in a scope of the invention. For example, although the LCD 20 and the key operation unit 22 are separated from each other in the aforementioned embodiment, a new LCD may be provided for the lower cabinet 12 by unifying the LCD 20 and the key operation unit 22 to form a LCD of a touch panel type, which is situated on the position of the LCD 20. Since the areas for displaying information can be increased according to the aforementioned devices, a new effect that more information can be displayed by effectively using the surface areas of the folding portable communication unit can be achieved. The similar effect can be achieved for the simplified LCD 26. Moreover, although the LCD 20, the simplified LCD 26 and the simplified key operation unit 28 are provided for the upper cabinet 10 for convenience of mounting in the aforementioned embodiment, the simplified LCD 26 and the

simplified key operation unit 28 may be provided for the rear cover of the lower cabinet 12. Still more, whether information is displayed on the LCD 20 or on the simplified LCD 26 may be decided in accordance with instruction of the user.

[Effects of the Invention]

5 As mentioned in the above, since the display operation part is situated on the rear cover of the first or second cabinet, a user can watch the display contents in display operation part and operate even in case that the upper and lower cabinets are folded.

Since the first display / date-input means is situated on the obverse surface
10 of the first and second cabinets, the second display operation part is situated on the rear cover of the first or second cabinet, and control means for controlling whether information can be displayed on either of the first or second display operation part depending on whether first and second cabinets are folded or not and on the kind of information, the folding portable communication unit can be operated in various ways
15 and facility for usage highly increases. Especially in case that the surface area of the first display operation part is larger than that of the second display operation part and the first and second cabinets are folded, consumed electric power can be saved by displaying information on the second display operation part. Moreover, when pictorial information is displayed, visibility of information can be heightened by
20 displaying information on the first display operation part.

[Brief Description of the Drawings]

[Figs. 1] They show the perspective view for the external shape of the folding portable communication unit according to a preferred embodiment of the invention, wherein (a) is a perspective view for showing a state that the upper and
25 lower cabinets are opened, and (b) is a perspective view for showing a state that the upper and lower cabinets are closed.

[Fig.2] It shows a structure of a simplified key operation unit 28 used in a folding portable communication unit according to a preferred embodiment of the

invention.

[Fig.3] It is a block diagram for showing an electrical configuration of a folding portable communication unit according to a preferred embodiment of the invention.

5 [Fig.4] It is a block diagram for showing a structure for selecting the display in accordance with the kind of information to be displayed.

[Figs.5] They show structures of a LCD 20 and a simplified LCD 26, wherein (a) shows a structure of a simplified LCD 26, and (b) shows a structure of a LCD 20.

10 [Fig.6] It shows cross-sectional views of a LCD 20 and a simplified LCD 26, each being mounted on a substrate, cut in a plane vertical to a rotational axis of a hinge 14.

[Figs.7] They show the perspective views for the external shape of the conventional folding portable folding portable communication unit, wherein (a) is a
15 perspective view for showing a state that the upper and lower cabinets are opened, and (b) is a perspective view for showing a state that the upper and lower cabinets are closed.

[Reference Numerals]

- 10 upper cabinet (first cabinet)
- 20 12 lower cabinet (second cabinet)
- 14 hinge
- 20 LCD (first display operation part)
- 22 key operation unit (first display operation part)
- 26 simplified LCD (display operation part, second display operation part)
- 25 28 simplified key operation unit
(display operation part, second display operation part)
- 30 arrayed button
- 32 four direction-selecting key

- 42 control unit (control means)
- 46 open / closed -detecting switch (detecting means)
- 48 LCD driver (detecting means)

[Document] Abstract

[Summary]

[Object] It is an object of the invention to provide a folding portable communication unit which secures compactness, lightness, visibility of a LCD, and improved operability.

[Means for Solving by the Invention]

A folding portable communication unit is composed an upper cabinet 10, a lower cabinet 12, and a hinge 14 for so supporting the upper and lower cabinets 10 and 12 that they are rotational around the hinge. A simplified LCD 26 and a simplified key operation unit 28 are provided for a rear cover of the upper cabinet 10 or the lower cabinet 12, and thereby a user can watch the simplified LCD 26 or operate the simplified key operation unit 28, even when the upper and lower cabinets are folded. Information is controlled to display on either of a LCD 20 or the simplified LCD 26 depending on whether the upper and lower cabinets are folded or not and on the kind of information to be displayed.

[Selected FIG.] FIG. 1